Goal 1
Clean Air and Global Climate Change
- An Overview -

U.S. Environmental Protection Agency

Structure of the Goal

Clean Air and Global Climate Chang

- **Outdoor Air**
  - Cleaner Air (Criteria Pollutants, Acid Rain, Haze)
  - Air Toxics
- **Indoor Air**
- **Stratospheric Ozone**
- **Radiation**
- **Greenhouse Gases**
- **Research and Science**

Significance of Risk/Benefits

1. Comparative Risk Studies
2. Brookings Study: “Improve Air Quality”
3. Thompson Report (OMB)

Goal 1
Selected Risk Drivers

- **Particulate matter (PM)**
  - Single greatest threat from ground-level air pollution
  - Tens of thousands of premature deaths per year
  - Linked to many respiratory and cardiovascular illnesses
  - Precursor to regional haze: link to acid rain
- **Ozone**
  - Even at low levels, ozone can cause acute respiratory problems
  - Repeated exposure may permanently injure the lungs
- **Indoor Air**
  - Health risks high due to indoor exposures to Asthma Triggers, Radon, ETS and Air Toxics
  - Costs of poor indoor air quality at 10's of billions of dollars annually due to direct medical costs and lost productivity
- **Air Toxics**
  - Cause cancer, reproductive disorders, birth defects, and damage to nervous system
  - Pollutants persist in the environment increasing exposure and risks (e.g., mercury & dioxins)

The Air & Radiation Program
The Federal Role

- **Set National standards with states/locals/tribes implementing**
  - (*e.g., NAAQS, toxic air pollutants)*
- **Help states/locals/tribes attain standards with national programs**
  - (*e.g., vehicle emission standards, acid rain program)*
- **Global program**
  - (*e.g., stratospheric ozone, climate)*
- **Provide tools for states, locals, tribes, and others**
  - (*e.g., emission models, guidance, & grants*)
- **Air quality, economic and policy analysis**

Tools for Success

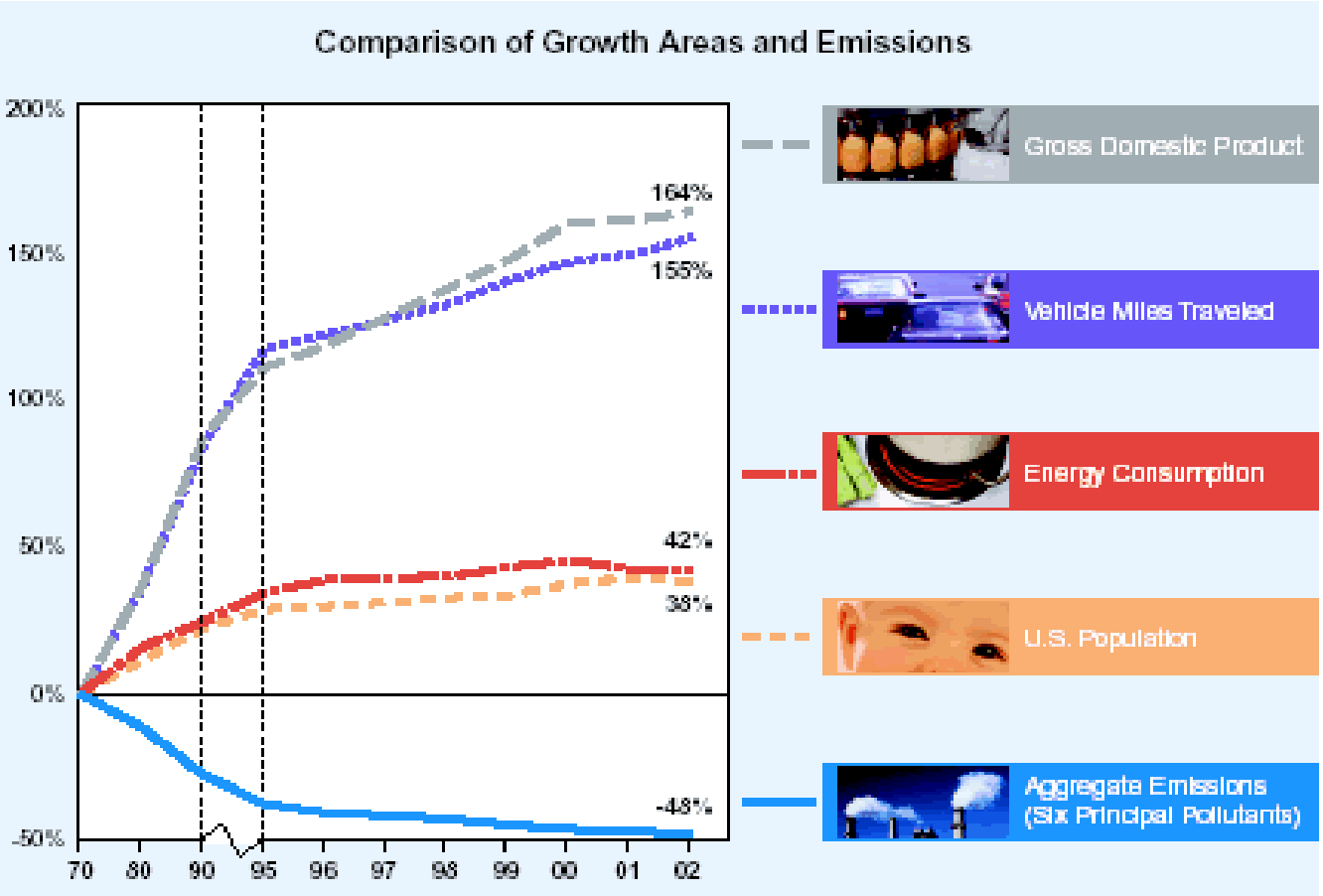
- **Performance standards**
- **Emissions limits**
- **Stakeholder consultation**
- **Trading and economic incentives**
- **Voluntary programs**
  - Hybrid voluntary/enforcement programs
- **Partnerships with state and industry**
- **Compliance & technical assistance**
- **Information**

Research Under Air Goal

- **Two major areas of research, described in multi-year plans**
  - PM/Ozone
  - Air Toxics
- **Multimedia research (e.g., global change, mercury) will be discussed in future Goal meeting**

Progress Toward Clean Air 1970-2002

Pollution Down While Growth Continues



Air Quality-Criteria Pollutants: Progress

- **Since 1990, the number of areas in attainment has increased**
  - CO: 78 of 78
  - PM: 73 of 85
  - Ozone (1 hr): 80 of 101
- **New PM and ozone standards in 1997**
- **Strategies to meet 1999 Regional Haze rule are being coordinated with ozone & PM strategies**

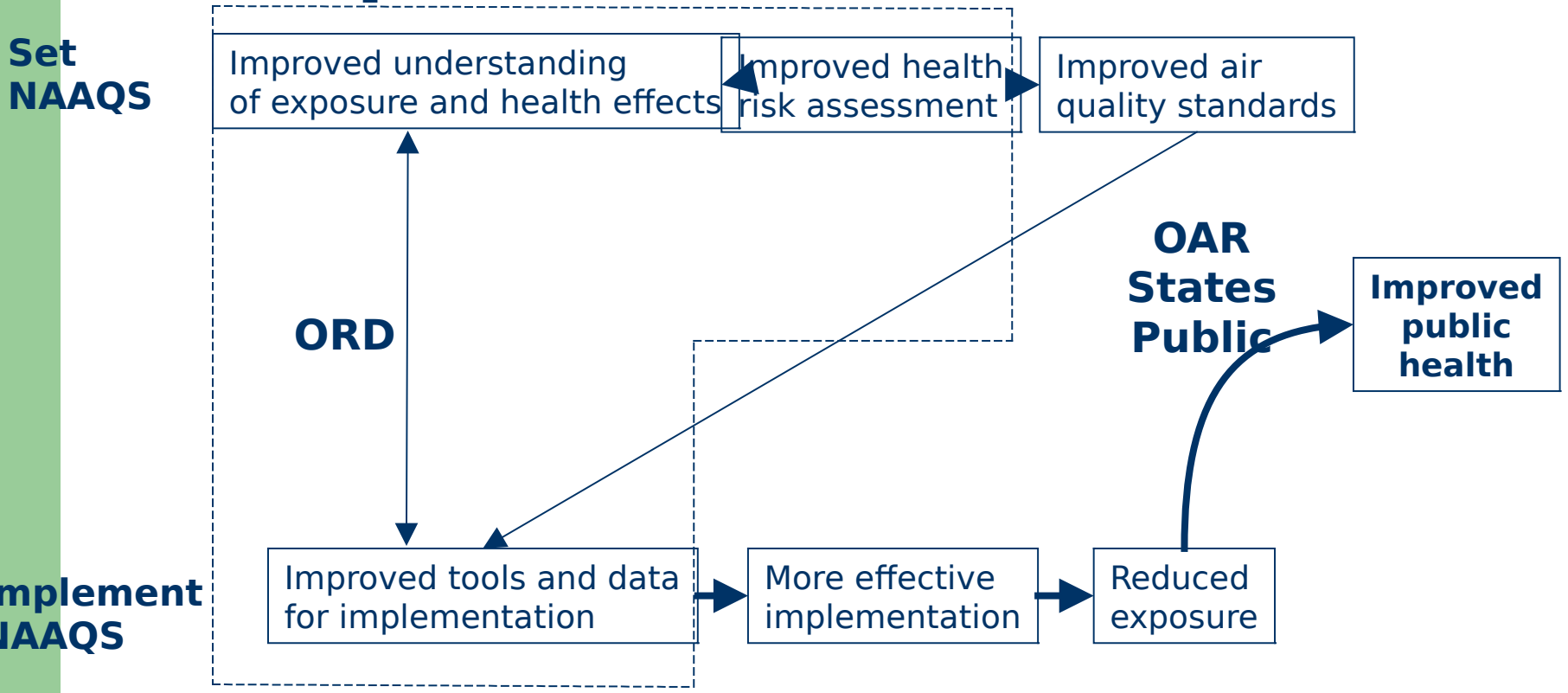
Air Quality: Challenges

- **New PM 2.5 and ozone standards set in 1997 upheld by Supreme Court decision**
  - Next periodic reviews now underway
- **$PM_{2.5}$ single greatest health threat**
- **Ozone problems persist**
- **Rules establishing implementation frameworks under development**
- **Regional Haze: Integrating implementation with PM, acid rain and ozone strategies**

Air Quality: Supporting Science for Criteria Pollutants

- **Emission Characterization/Inventories**
- **Risk Assessment/Staff Paper (Based on ORD Criteria Document)**
- **Monitoring**
- **Economic Analysis**

Research and Regulatory Program Interactions – PM example



Air Quality: Supporting Science for Criteria Pollutants

Health and Exposure Research

- **Epidemiological, clinical, and toxicological studies of PM health effects in normal and susceptible populations**
  - PM mechanisms (including cardiovascular effects)
  - Biological effects of PM sources and hazardous components
  - Susceptible populations and factors susceptibility
  - Disentangling PM and co-pollutant effects
  - Exposure response relationship for source-based components
- **Long term (10 year) epidemiologic grant to be awarded**
- **PM Centers (re-compete in planning stages)**
- **Human exposure modeling and measurements**

Air Quality: Supporting Science for Criteria Pollutants

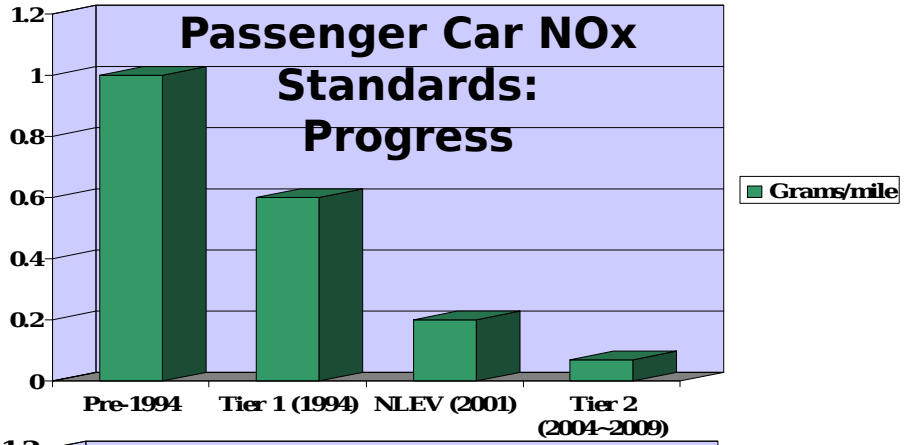
Implementation Research

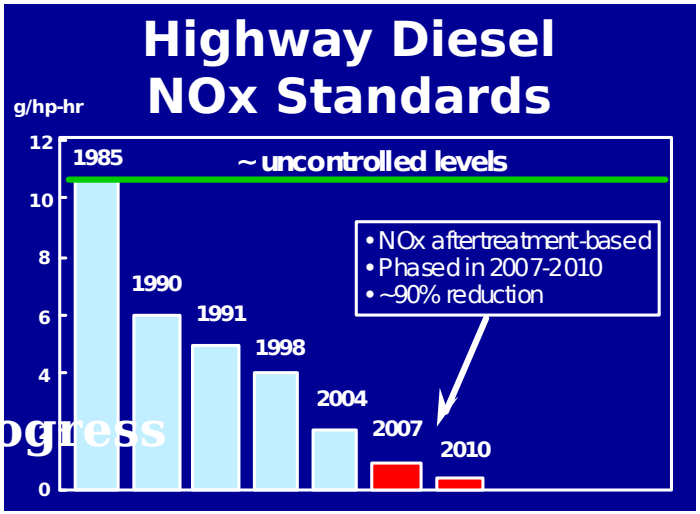
- **Emission profiles/factors**
  - *e.g.*, Emissions from CAFOs
- **Source apportionment**
  - To determine most significant sources
- **Atmospheric chemistry**
  - To improve AQ models
- **Air quality modeling**
  - *e.g.*, CMAQ development and refinement
- **Ambient methods/measurements**
  - *e.g.*, Support development of FRM
- **Control technology**
  - *e.g.*, Evaluate multi-pollutant control technologies

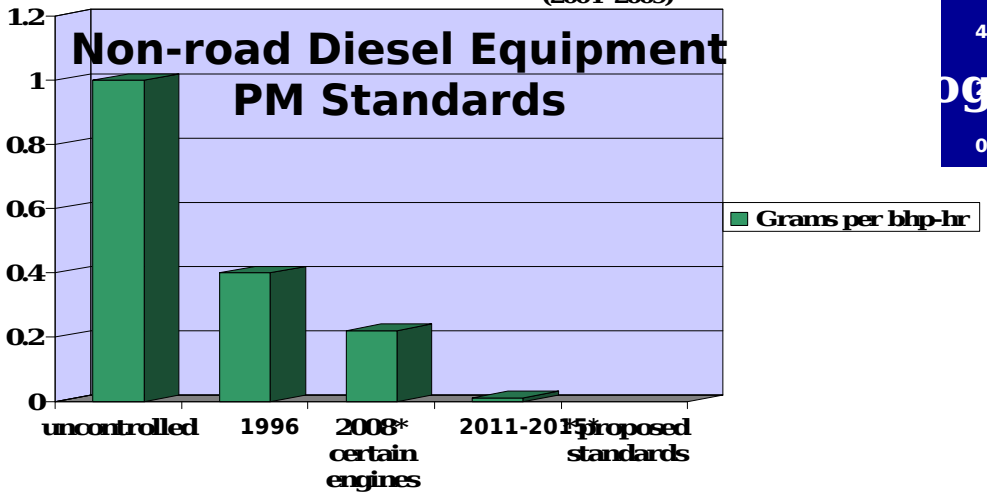
Vehicle Pollution: Progress

- **Passenger vehicles:**
  - 77-95% cleaner starting fall 2003
- **Trucks and buses:**
  - 90-95% cleaner starting 2007
- **Non-road diesel equipment**
  - 90-95% cleaner starting 2008 (proposed)
    (construction, farming, industrial equipment)
- **Clean-burning reformulated gasoline**
- **Ultra low sulfur gas and diesel fuels**

Mobile Source Vehicle Standards: Progress







Vehicle Pollution: Challenges

- Implement 2007 clean diesel rule
- Promulgate non-road diesel rule
- Further reduce pollution from locomotives, marine, and aircraft engines and fuels
- Reduce pollution from existing fleet
- Vehicle Miles Traveled (VMT) growth

Vehicle Pollution: Challenges (continued)

- **MTBE in drinking water**
- **Increased use of renewable fuels**
- **Transportation planning/conformity**
- **Certification and Compliance**
  - 100% increase in compliance obligations since 1997 (continuing to grow rapidly)
- **In-use, real-world emission measurement of mobile sources**

Vehicle Pollution: Supporting Science

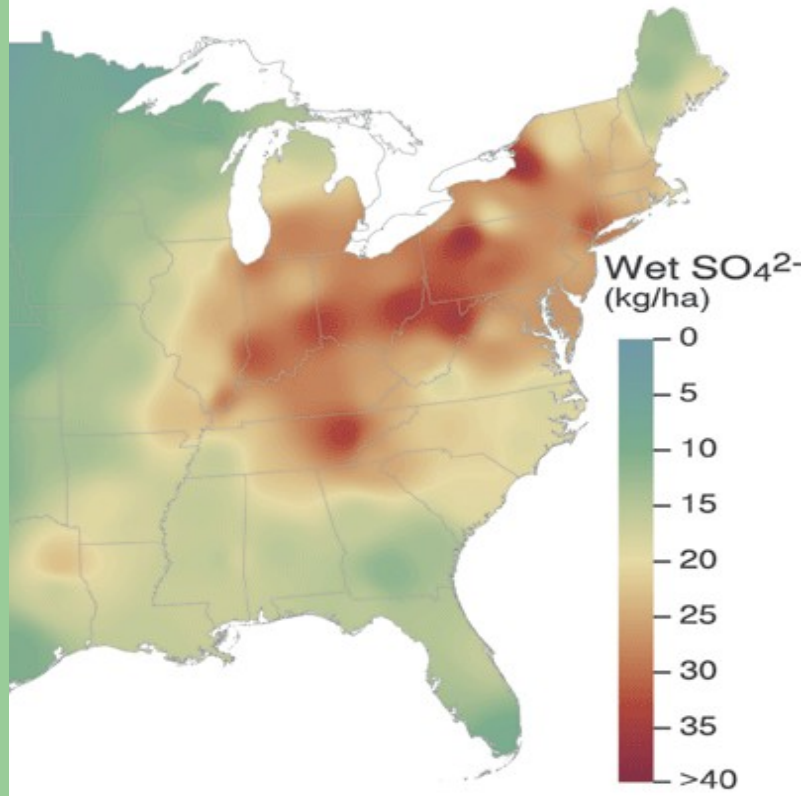
- Emission Factors
- Models: MOBILE 6, NONROAD, MOVES
- Evaluation of near-roadway and “hot spot” exposures
- Source apportionment/source signature
- Economic Analysis
- Testing and Risk Assessment (§211 Program)
- Technology Assessment

Acid Rain: Progress

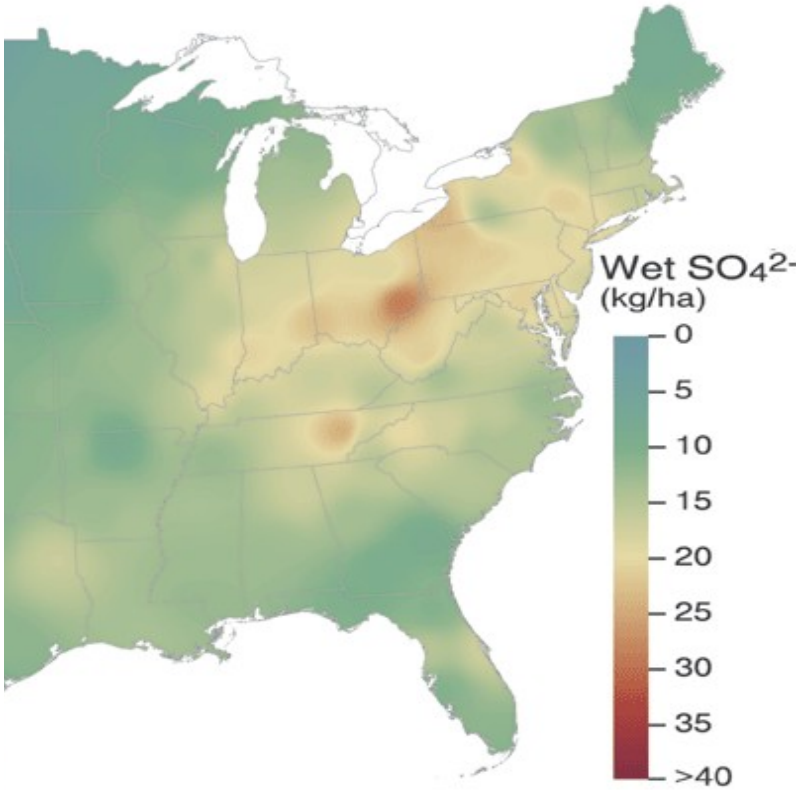
- SO_2 emissions down 5.5 million tons/year
- NOx emissions down 1.5 million tons/year
- Rainfall in eastern U.S. up to 25% less acidic
- Program highly cost-effective - Benefits are 40 times the costs

Monitored Reductions in Acid Rain: Progress

1989-1991



1999-2001



Acid Rain: Challenges

- **Many believe the problem of acid rain was solved with passage of 1990 CAAA**
- **Hubbard Brook Study (March 2001) demonstrates that acid rain is still a significant problem**
  - Sulfur emissions have declined but overall nitrogen emissions have not changed substantially
- **Further cuts in emissions still needed**
  - With additional 80% reduction in sulfur emissions from electric utilities, streams would change from acidic to non-acidic in

    20-25 years

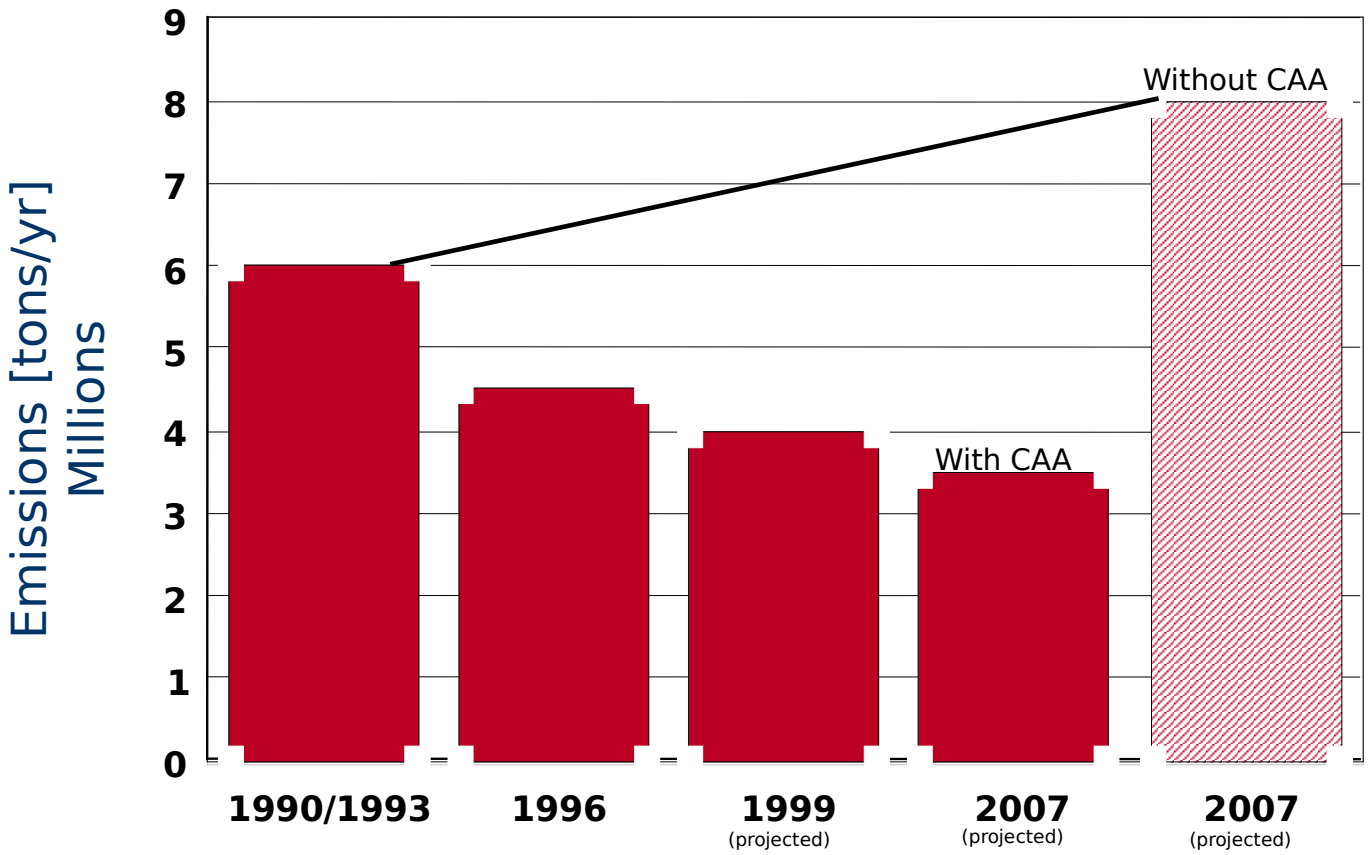
Acid Rain: Supporting Science

- Clean Air Status and Trends NETwork (CASTNET)
- Eco-system Assessment
- Modeling/Economic Analysis
- Temporally-Integrated Monitoring of Ecosystems (TIME)/Long-Term Monitoring (LTM) (Goal 4)

Air Toxics: Progress

- **Completed standards for major stationary sources will eliminate nearly 1.7 million tons of toxic air emissions**
- **Mobile source standards will eliminate another 1.1 million tons between 1996 and 2010**
- **Working with communities to address “hot spot” issues (e.g. Cleveland, Charlotte)**

Air Toxic Emissions 1990-2007:



Air Toxics Community-Based Programs: Progress

- **Assessments show that "hot spots" exist in urban areas due to cumulative impacts**
  - Communities want these problems addressed
- **Over 30 ongoing projects led by the Regions**
- **Led to development of Community Action for Renewed Environment (CARE) initiative**
- **Providing technical assistance and tools to the regions, states, localities, and tribes**

Diesel Retrofit Program: Progress

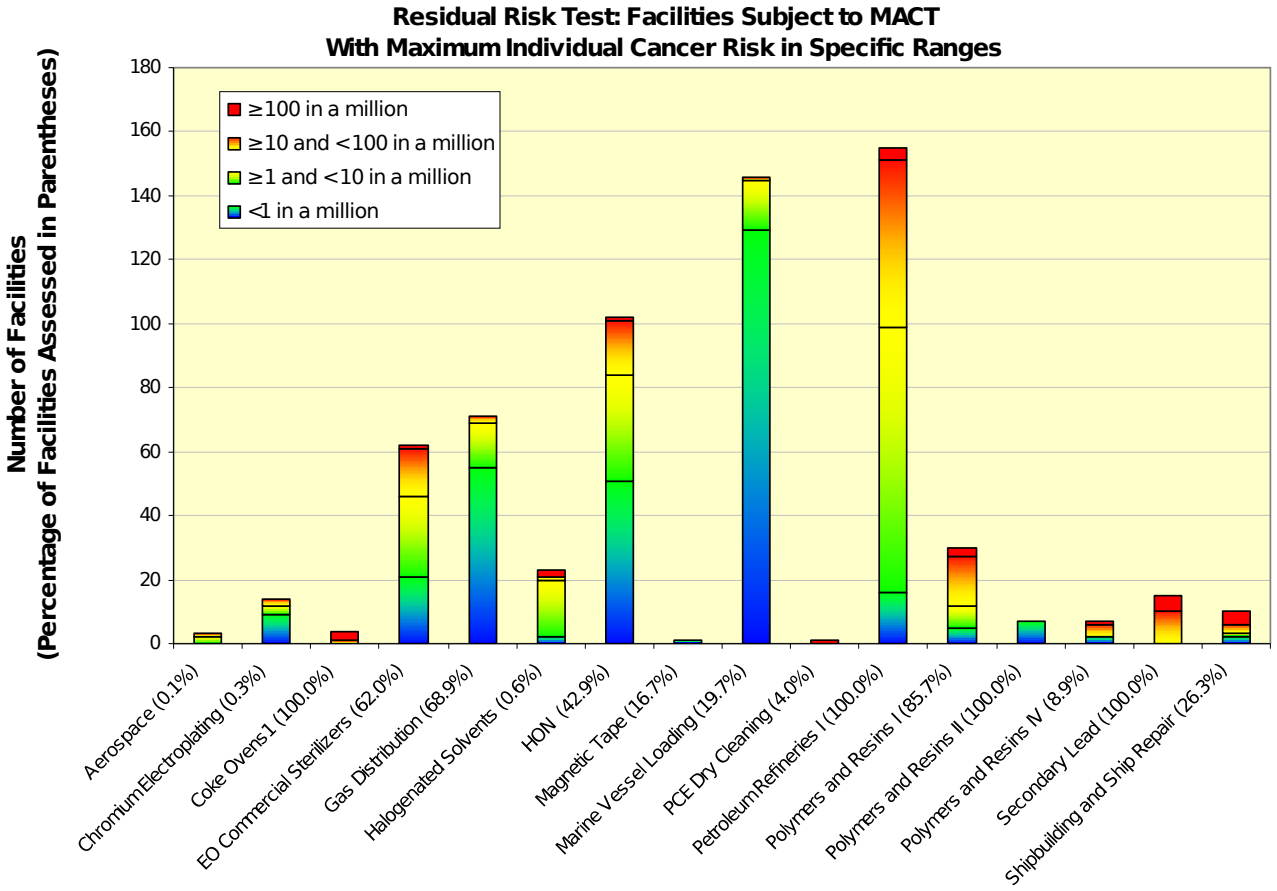
- **Eliminating pollution (tons):**
  - Approximately 80K tons of PM,HC, CO & NO_x
- **EPA funded demonstration projects**
  - States are creating their own funding mechanisms
  Partners match funds
- **Technology Verification**
- **Clean School Bus USA (Energy Bill authorizes EPA $300 million)**

- **Anti-Idling Initiative**

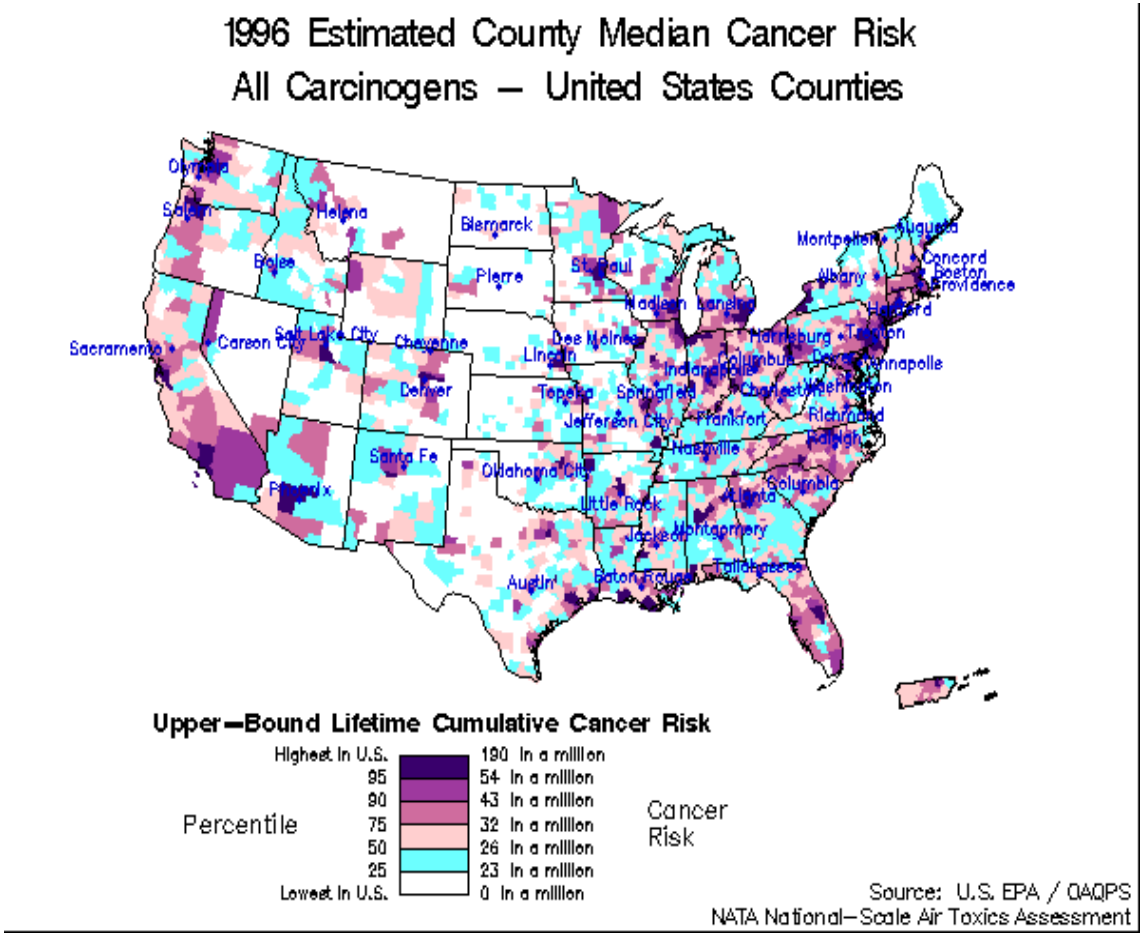
Air Toxics: Challenges

- Assess residual risks/Set standards if necessary
- Assess area source emissions and set standards
- Reassess fuels & vehicles in 2004
- Propose Utility standard to control mercury and other toxics
- Expand work with communities
- Expand air toxics monitoring networks nationally
- Need for information on exposure and risk at the local level (“hot spots”)

Air Toxics: Supporting Science



National Air Toxics Assessment (NATA)



Air Toxics: Supporting Science (continued)

- **Risk Assessment**
  - Residual Risk/Petitions
  - NATA
  - Model Development: MOBILE 6.2, MOVES
  - Improving emission inventories and air quality modeling
- **Technology Assessment**
- **Monitoring**
- **Economic Analysis**

Air Toxics: Supporting Science (continued)

Research Activities

- **Reduce Uncertainty in Air Toxics Risk Assessments**
  - Improving Acute Assessment
    - ARE methods, health effects, susceptibility, human exposures
  - Chronic Approach
    - Shape of the dose response curve for PAHs, IRIS Assessments
  - Community Assessment Tools
  - Emission and human exposure measurement and modeling
- **Implement Risk Reduction of Air Toxics**
  - Mobile Source emissions profiles
  - Indoor Air research
  - National and Community Assessments
    - Atmospheric chemistry and modeling.
  - Emission monitoring tools
    - Jet REMPI for trace organics
  - Residual Risk Support

Indoor Air

- **Americans spend 90% of time indoors -- some pollutant concentrations average 2-5 times higher than outdoors**

- **Voluntary program tackles greatest risks**
  - Radon -- 2nd leading cause of lung cancer after smoking
  - ETS -- worsens asthma, causes hundreds of thousands of respiratory diseases in children, lung cancer
  - Other pollutants such as VOC's & CO
  - Moisture/mold
  - Statutory authority to research and educate, but not to regulate

Indoor Air: Progress

- **Action through network of over 100 national, state, tribal, and local partners**
- **Award winning media campaigns**
- **Achieving real results:**
  - Reduced children's exposure to ETS in homes from 27% to 20%
  - Fixed homes with high radon levels (700,000); building new radon-resistant homes (1 million)
  - Improved the environment of more than 10,000 schools

Indoor Air: Challenges

- **Small, voluntary program addressing multiple contaminants and high risks must:**
  - Maintain momentum with modest investment
  - Have compelling messages based upon sound science
  - Work via kaleidoscope of public, private and non-profit partners, each with financial and/or constituency pressures
- **Link with EPA regulatory and other community-based risk-reduction activities**

Indoor Air: Supporting Science

- **BASE data analysis** (survey of office building IAQ)
- **Indoor Air Toxics Ranking Analysis**
- **School Health/Performance Intervention Study Design** (with CDC)
- **Surveys to assist development of ETS and Asthma measures**

Indoor Air: Supporting Science (continued)

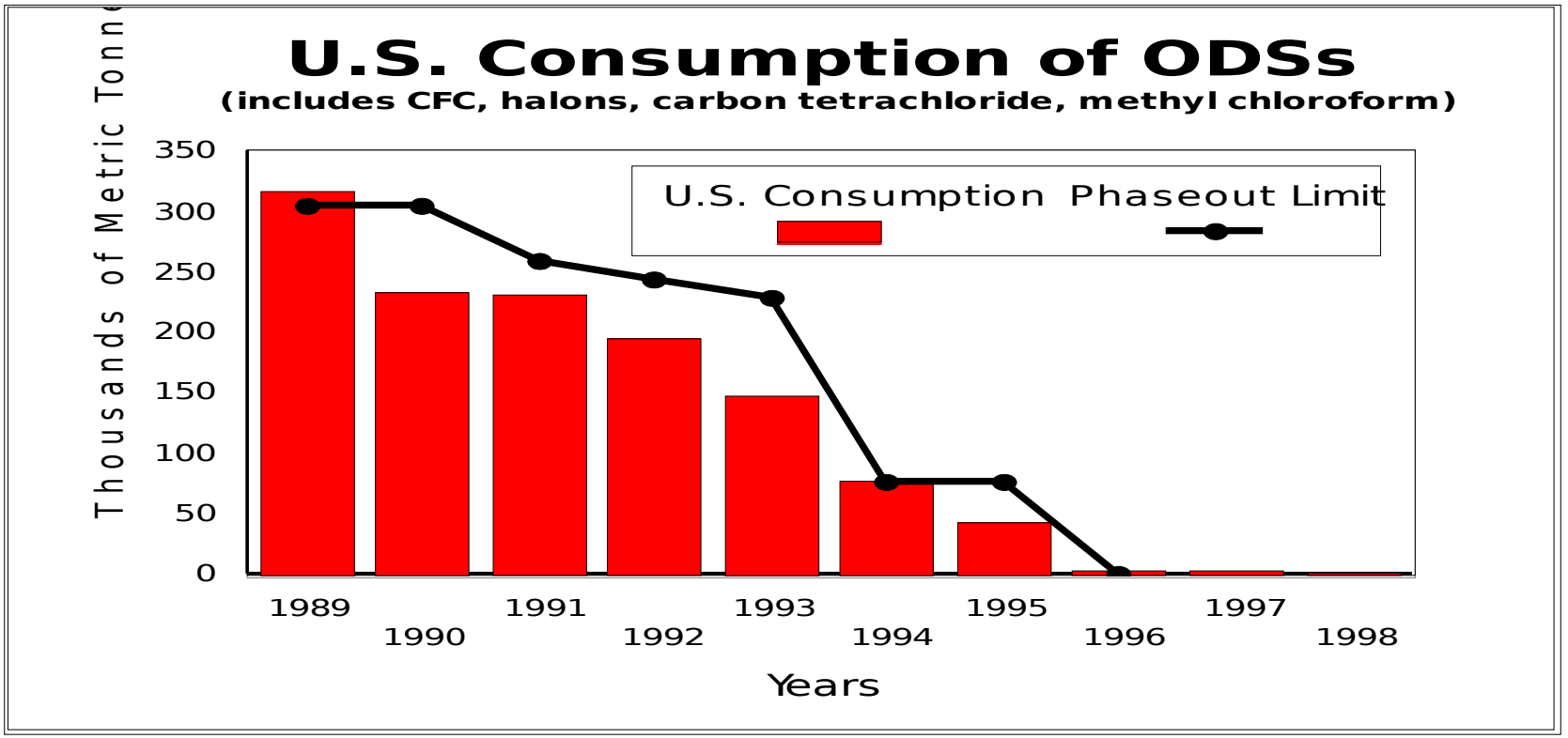
Research

- **Biological contaminants/sensitization, allergy, and irritation**
  - Effects, monitoring and mitigation
- **Building design and operations**
  - Focus on large buildings, HVAC systems
- **Indoor air chemistry, emissions and modeling (air toxics)**
- **Product and Technology Verification**
- **Human exposure – total/ambient/indoor (PM focus)**
  - Detroit study

Title VI – Ozone Layer Protection

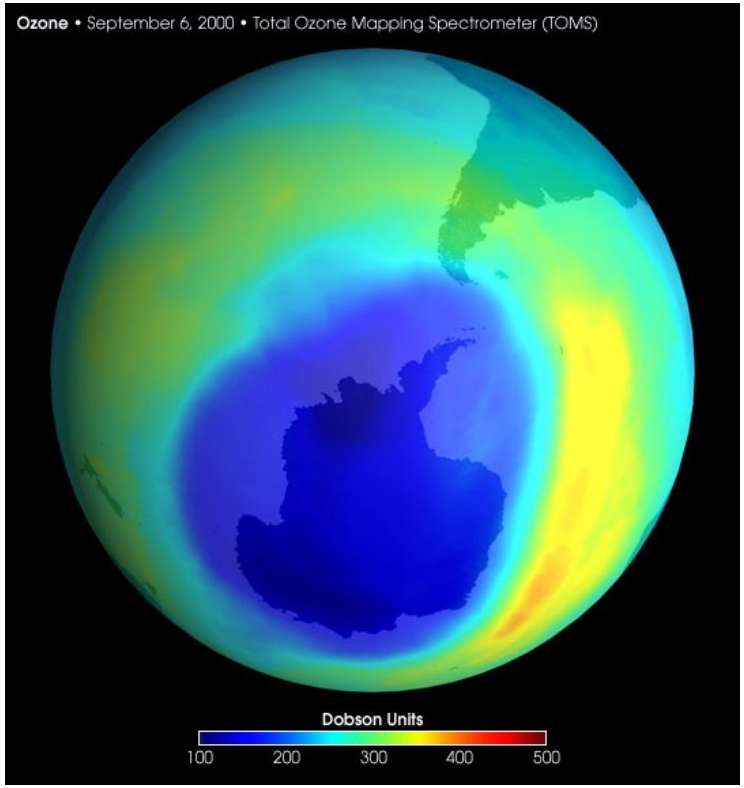
- **Phase-out of production and consumption of CFC's, HCFC's, and other ozone-depleting substances (ODS)**
- **Requires controls on various products containing ODS's**
- **Implement and enforce rules controlling production, import, and emission of ODS's**

Ozone Layer Protection: Progress



On track to save 6.3 M US lives and avoid 299M non-fatal skin cancer and 27.5 M cataract incidences

Ozone Layer Protection: Challenges



- Ozone layer could begin recovery by 2010 assuming worldwide compliance
- Continued support for the Montreal Protocol Fund essential for worldwide support
- Critical use exemptions, allocation of methyl bromide

Ozone Depletion: Supporting Science

- **Assessments in support of Significant New Alternatives Program (SNAP)**

Radiation Program

- **Principal office in EPA focused on ensuring protection of public health and the environment from exposure to radiation**
  - Regulation and Guidance Development; exploring Voluntary Programs
  - Technical Support to rest of Agency for Radiation Risk Assessment and Policy
  - Laboratory capabilities: analysis and field work
- **Current Activities:**
  - Comments on additional options for disposal (ANPRM)
  - Federal Guidance for General Public
  - Significant Homeland Security Responsibilities for Radiological Emergency Response

Climate Change: Progress

- **EPA's domestic climate change activities build on Agency's unique strengths:**
  - Forging partnerships across broad range of stakeholders
  - Providing strong analytical skills, assessing technology and risks, costs and benefits of action
  - Identifying realistic, near-term actions and innovative policies

Climate Change: Progress (continued)

- **Domestic Voluntary Programs**
  - Energy Star
  - Methane/High-GWP: EPA leads efforts on non-CO_2 gases
  - New Initiatives (Clean Energy/Climate Leaders)
  - State and Local activities
- **Domestic Transportation Programs**
  - SmartWay and Best Work Places for Commuters
  - Technology initiatives
- **Climate Support Functions**
  - Economic modeling
  - GHG Inventory
  - Climate communications
- **International activities** include work on emission inventories, market-based mechanisms, clean energy and energy efficiency, integrated environmental strategies, transportation

Climate Change: Supporting Science

- Clean Car Program
- Technology evaluation
- Monitoring development

NAS Studies

- PM Research Strategy (January 2004)
- Air Quality Management (December 2003)
- Biological Effect of Ionizing Radiation (BEIR VII) (Late 2004)
- Low Level Radioactive Waste disposal

New Studies:

- New Source Review
- Regulatory Models (Cross-Media Support)

Other Studies of Interest:

- Dioxin, TCE, Bio-monitoring and Public Health

Pending Legislation

- **Clear Skies**
- **Energy Bill**
  - Address MTBE issue
  - Establish an EPA - implemented Renewable fuels program
  - Clean school bus program
  - Anti-truck idling program
- **Highway Bill**
  - Renew Congestion Mitigation Air Quality program (CMAQ)
  - New flexibility on transportation conformity